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Monopsony Power and Minimum Wages

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Abstract

In this study, we perform an assessment of the level of monopsony power in the Portuguese labor market by building on the existing dynamic monopsony literature. After producing firm-level estimates of the labor supply elasticity, we found evidence of employers having a large degree of market power in the labor market. Furthermore, we perform an assessment of the joint impact of monopsony power and the minimum wage on the employment level of the labor market. Our findings confirm the predictions made in the literature. We conclude that an increase in minimum wage will increase the employment level of an employer with a high degree of monopsony power.

Keywords: Monopsony, Minimum wages, Wage setting, Labor market frictions.

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1 Introduction

"*As long as a higher wage helps firms to recruit workers, the firm has some monopsony power.*"

(David Card and Alan Krueger,*The New Economics of the Minimum Wage*, 1995)

Nowadays, there is a growing number of studies that investigate the extent of monopsony power in the labor market. In order to discuss the relevance of these contributions, first it is important to understand why exactly economists are abandoning the notion of a "frictionless perfectly competitive market".

Traditionally, in a perfectly competitive labor market, it was assumed that every worker and firm had perfect information about the number of jobs available on the market and that workers were rational and able to process this information automatically and behave accordingly, facing no switching costs. The outcome of such model gives no choice to employers than to offer the individual marginal revenue of product to the worker. Wage dispersion is possible in such model and could be the consequence of heterogeneity of workers and firms. Since productivity levels of agents can vary and workers may have differences in their preferences for non-monetary benefits, firms can offer different combinations between such benefits and the wage they pay. Nevertheless, the model still predicts that the "law of one price" holds, meaning that for the same job, every firm will have to offer the market price of labor for a given worker. Therefore, the model foresees that a one cent decrease in wages will make the labor supply to the firm to drop to zero. In the real labor market, such prediction is very unlikely to hold since real labor markets have market frictions and agents do not have perfect information.

Contrarily, under imperfectly competitive labor markets it is assumed that wages vary according to many different factors. For instance, such model would assume that job offer arrival rates are not infinite (as the competitive model does), that the size of the labor market, number of employers and job destruction rates impact on wages and also that employees may have different reservation wages, based on their preferences.

The term monopsony, which literally means "sole buyer", was coined during the late 1920s

by Joan Robinson, who was the first to use the tools of neoclassical economic theory to analyze situations in which firms are not just wage takers (like the classical standard model predicts) but actually have wage-setting power in the labor market. Before this designation, the term used was ”monopoly-buyer”, and like monopoly power, economists regard monopsony power as a ”power over price through the control of quantity” (Boal and Ransom,1997), the only difference is that this power comes from the demand side and not from the supply side. The source of such power comes from the search frictions that exist in the labor market, including imperfect information, moving and learning costs, reputation costs, firm specific human capital, worker heterogeneous preferences, just to name a few. So, as a monopolist increases prices and faces a shorter supply, a firm with monopsony power will decrease the wage it pays and face a lower employment level, in order to maximize profits. One of the identifying characteristics of monopsony is that firms operate with vacancies, keeping employment artificially low. Therefore, monopsony power exists in the labor market if employers have discretion over the wage paid, which is the same as saying that the labor supply curve that the firm faces is upward sloping.

It is important to notice that the labor supply curve faced by the firm is not the same as the labor market supply curve. The last one reflects workers' decision to participate or not in the labor market, while the first one reflects worker's decision to accept any given job offer at a certain wage or to keep searching for another job. According to economic theory, both have a positive slope, with the labor market curve slope arising from heterogeneity of preferences of workers, as a trade-of between a higher wage and hours of leisure or number of employees. On the other hand, the positive slope of the labor supply curve faced by the firm arises from the fact that a firm that pays higher wages is expected to attract more workers from other firms. The standard classical model predicts that this curve is completely elastic, meaning that if a firm increases or decreases the wage paid by one cent, the supply faced by the firm would be infinite or zero, respectively. In the monopsony model, such predictions are not possible, since market frictions are considered, in an attempt to make the model's predictions closer to reality.

In what regards the minimum wage, both models offer different predictions for the outcome of an increase in the minimum wage. In the classical model, if a government sets the minimum wage

above the equilibrium level, firms will respond by decreasing employees and unemployment will increase in the labor market. On the other hand, in a monopsony model, a monopsonistic employer holds the employment level artificially low, because, in order to increase the employment level the firm needs to offer higher wages to new employees to attract them, and then also needs to pay this higher wage to the employees that already work in the firm. Therefore, an increase in the minimum wage can increase the employment level in the economy if the existing employers hold monopsony power.

Until now, there is no consensus in the economic community about the impact of minimum wages in the labor market. According to Card and Krueger (1995), there are no conclusive empirical evidences to confirm the impact of minimum wages. The monopsony model can offer explanations for these issues, since according to this model, the impact of minimum wages depends on the extent of monopsony power that each employer holds. Therefore, from a policy point of view, this model can provide some clarity and guidance to correctly predict the impact of a change in the minimum wage.

The purpose of this study is to estimate firm-level estimates of the labor supply elasticity, by building on the existent dynamic monopsony literature that will be introduced on Section 2. Section 3 presents the theoretical framework that sustains the methodology described in section 5. Section 4 describes the data used for this study. The results estimated in Section 5, which will reveal the existence of monopsony power in the Portuguese economy, will then be fed into an employment equation to assess the impact of monopsony power and minimum wages on the employment level. These results, and the model which estimated them, will be presented in Section 6. Finally, in Section 7, we will conclude.

2 Literature Review

The theory of Monopsony was first presented to the world in 1933, by Joan Robinson in the book ”The Economics of Imperfect Competition” (1933). Initially, this concept was perceived as a theoretical issue that could not be transposed to the real labor market. Nevertheless, in their paper

Burdett and Mortensen (1998) try to study the differences in wage setting power of employers, allowing for labor market frictions to be included in the model. They show that the unique non-cooperative steady-state solution to this "game" is a non-degenerate distribution of wage offers, in which workers receive a strictly positive but finite number of job offers per period.

The study of Burdett and Mortensen (1998) is seen as the first step towards the "new monopsony" literature, which was popularized by Allan Manning's (Manning, 2003) analysis of the labor market without the classical assumption of perfect competition. While the classical monopsony model predicts that the firm's market power was derived solely by geographic power, the new monopsony model predicts that labor market frictions are the main source of this power in the labor market. In his book, Manning suggests how to calculate the elasticity of the labor supply curve faced by the firm in the steady state using the wage elasticity of worker separations from their employers. Manning's work created some empirical interest in the subject (mainly on quantifying the elasticity of the labor supply curve faced by the firm), which was followed by a number of empirical studies that contributed to the development of the new monopsony literature with the development of Manning's original model.

The paper of Hirsch et. al (2010) is one of the first studies to implement Manning's guidelines and to estimate the labor supply elasticities to the firm for both men and women. Their results imply that at least one third of the gender pay gap may be originated by wage discrimination of profit-maximizing monopsonistic employers. Webber (2015) brings a particular contribution to the new monopsony literature, since it is the first study to compute firm-level measures of the labor supply elasticity that faces each private firm in the US. With this development, this paper was also able to estimate the distribution of monopsony power in American firms and showed evidence supporting the notion of the existence of a positive relationship between a firm's labor supply elasticity and the earnings of its workers. Hirsch et. al (2018) builds on Webber (2015) monopsony model to estimate the cyclicality of monopsony power and found that labor market power is greater during economic downturns [1]. Therefore, the model used in this paper is considered to be a seminal one in the new monopsony literature.

[1] The labor supply elasticity faced by the firm is procyclical.

The study by Garcia (2015) estimates the firm level elasticities of labor supply facing the firm, using a methodology similar to the one developed by Hirsch. The particularity of this study is that the author also performs an assessment of the determinants of monopsony power for the Portuguese labor market. Félix and Portugal (2017) also estimate the labor market power of firms in Portugal, however this study employs a different approach than the ones mentioned before since it measures the labor supply elasticity faced by the firm directly from its production function.

In the available new monopsony literature there are still many related issues, for instance in what regards the estimation of the effect of an increase in the minimum wage in the uncovered labor market. Bachmann and Frings (2016) provide an empirical analysis that estimates the degree of monopsony power in different German industries against the background of a statutory minimum wage introduction in 2015. Their results show that the level of monopsony power among low wage base industries has significant differences which implies that, from a policy point of view, the introduction of a uniform minimum wage may have different employment impacts in industries with the same wage bite.

3 Theoretical Model

At first sight, estimating the labor supply elasticity faced by the firm might appear to be the outcome of a straightforward regression of the firm's employment on the wages paid to its workers. However, this regression would be endogenous since the firm chooses simultaneously employment and wages. Therefore, we will follow an empirical strategy that provides firm-specific estimates of the labor supply elasticity based on the dynamic monopsony model of Manning (2003) which also draws from the equilibrium search model of Burdett and Mortensen (1998). This approach was further developed as the dynamic monopsony literature evolved with Hirsch et. al (2018).

We consider a firm that pays some wage w_t at time t. In line with the literature, we assume that the labor supply faced by the firm is given by:

$$N_t = N_{t-1}[1 - s(w_t)] + R(w_t) = N_{t-1}[1 - s^e(w_t) - s^n(w_t)] + R^e(w_t) + R^n(w_t) \quad (1)$$

where N_t is employment at the firm at time t, $R(w_t)$ is the number of recruits hired from period $t-1$ to t and $s(w_t)$ is the separation rate of the firm from period $t-1$ to t. Worker flows at the firm are divided by flows from/to employment ("e") and flows from/to non-employment ("n"). Defining $\gamma_t = [(N_t - N_{(t-1)})/N_{(t-1)}]$ to be the employment growth rate in such period and rearranging, it can be shown that:

$$N_t = \frac{[R^e(w_t) + R^n(w_t)](1 + \gamma_t)}{\gamma_t + s^e(w_t) + s^n(w_t)} \quad (2)$$

After taking logs on both sides, differentiating and multiplying by w_t. It shows that the labor supply elasticity can be defined as:

$$\epsilon_{Nw} = \theta_R(w_t)\epsilon^e_{Rw} + [1 - \theta_R(w_t)]\epsilon^n_{Rw} - \frac{s^e(w_t)\theta_s(w_t)}{\gamma_t\theta_s(w_t) + s^e(w_t)}\epsilon^e_{sw} - \frac{[1 - \theta_s(w_t)]s^n(w_t)}{[1 - \theta_s(w_t)]\gamma_t + s^n(w_t)}\epsilon^n_{sw} \quad (3)$$

where ϵ^e_{Rw} (ϵ^n_{Rw}) stands for the recruitment elasticity from employment (non-employment), ϵ^e_{sw} (ϵ^n_{sw}) the separation rate elasticity to employment (non-employment), $\theta_R(w_t)$ the share of recruits from employment and $\theta_s(w_t)$ the share of separations to employment.

That is, in order to estimate the elasticity of labor supply faced by the firm, one needs to estimate four job flow elasticities. For the two elasticities of separations we can estimate them using a matched employer-employee data set. On the other hand, for the two elasticities of recruitment we would need information on the number of applications that each firm receives for any job at a certain wage rate. Since this information is not available, we resort to previous literature using Burdett and Mortenssen's (1998) equilibrium search model. In this model, employed workers search on the job and receive offers at a constant rate λ with wages drawn from the wage distribution $F(w_t)$. Since workers are assumed to change job if the wage offered is higher than their current one, the

separation and the recruitment rates to employment are given by

$$s^e(w_t) = \lambda[1 - F(w_t)] \tag{4}$$

$$R^e(w_t) = \lambda \int_{\underline{w}}^{w_t} N(x)dF(x) \tag{5}$$

where $\underline{w}$ represents workers' common reservation wage. Using (4), the separation rate elasticity to employment can be defined as:

$$\epsilon^e_{sw} = -\frac{\lambda F'(w_t)w_t}{s^e(w_t)} \tag{6}$$

Combining (2), (5) and (6), the recruitment elasticity from employment can be written as:

$$\epsilon^e_{Rw} = \frac{\lambda N_t F'(w_t)w_t}{R^e(w_t)} = -\epsilon^e_{sw}\frac{s^e(w_t)N_t(w_t)}{R^e(w_t)} = -\epsilon^e_{sw}\frac{\theta_s(w_t)(1+\gamma_t)s^e(w_t)}{\theta_R(w_t)[\theta_s(w_t)\gamma_t + s^e(w_t)]} \tag{7}$$

Next, for the recruits from non-employment, Manning (2003) stated that by using the expression of recruitment for $\theta_R(w_t)$ and taking logs, differentiating and multiplying with respect to w_t, one would obtain:

$$\epsilon^n_{Rw} = \epsilon^e_{Rw} - \frac{w_t\theta'_R(w_t)}{\theta_R(w_t)[1-\theta_R(w_t)]} = \epsilon^e_{Rw} - \frac{\epsilon^R_{\theta w}}{1-\theta_R(w_t)} \tag{8}$$

where $\epsilon^R_{\theta w}$ denotes the wage elasticity of the share of recruits hired from employment. Finally, by combining (3), (7) and (8) one reaches to the expression that allows us to estimate the labor supply elasticity faced by the firm:

$$\epsilon_{Nw} = -\epsilon^e_{sw}\frac{\theta_s(w_t)[1+\gamma_t+\theta_R(w_t)]s^e(w_t)}{\theta_R(w_t)[\theta_s(w_t)\gamma_t + s^e(w_t)]} - \epsilon^n_{sw}\frac{[1-\theta_s(w_t)]s^n(w_t)}{s^n(w_t)+[1-\theta_s(w_t)]\gamma_t} - \epsilon^R_{\theta w} \tag{9}$$

Therefore, in order to estimate ϵ_{Nw} one needs to model and estimate three elasticities (ϵ^e_{sw}, ϵ^n_{sw} and $\epsilon^R_{\theta w}$) and combine them with $\theta_R(w_t)$, $\theta_s(w_t)$, $s^e(w_t)$, $s^n(w_t)$ and γ_t. This final equation is different from the one of Webber (2015) since we follow Hirsch et. al (2018) methodology that in

the model theoretical conditions (4) and (5) imposes that $R(w_t)/R^e(W_t) = 1$.

4 Data

For this study, we use *Quadros de Pessoal* ("Personnel Records"), a longitudinal matched employer-employee-job data set that started in 1985 (with two interruptions in 1990 and 2001). QP is an annual compulsory employment survey that reports all establishments with at least one wage earner and that, is assumed to be less affected by panel data issues such as panel attrition or measurement errors since it has a mandatory nature and is reported by employers. In a public space, this data set provides information on individual workers and employers, with detailed and precise information on earnings, containing not only the base wage but also regular and irregular benefits, overtime pay and details on the collective agreement in place. Cardoso et. al (2013) provides a very detailed description of the data set.

We use a sample that consists in yearly observations with workers that age from 18 to 64 years old spanning from 2002 to 2017. The year of 2002 was chosen to be the first year of our sample in order to avoid having to deal with missing years, which could compromise the estimation of separations and recruitments of employees. Only workers with a wage of at least 80% of the minimum wage are considered, with the minimum wage varying from 348 to 557 euros, from 2002 and 2017 respectively. We also restrict this sample to workers with full schedule. Furthermore, as in Webber (2015), we only include an employment spell if it is considered to be the dominant job, defined as being the job that pays the highest wage for that individual. This restriction's purpose is to include only the job that is more relevant for the employee. In Webber (2015) the author also makes restrictions on the length of employment, only considering spells with more than 3 quarters, since we have yearly data, we cannot make such restriction.

Additionally, we limit this analysis to firms that had at least 100 employment spells of any length over the period of analysis. Furthermore, for the analysis of the firm-level labor supply elasticity, we will only consider firms with at least 20 separations to employment, 20 separations to unemployment, 20 recruits from employment and 20 recruits from unemployment over the lifespan

of the firm at this period. With the latter restriction, which is slightly more tolerant than in Webber (2015) [2], our sample yields 9 136 500 observations, 1 661 911 single individuals, 2 534 different firms and 3 035 083 employment spells.

5 Firm-level labor supply elasticity

Methodology

As stated before, in order to measure ϵ_{Nw}, three elasticities must be estimated first. Therefore, we should start by modeling the separation rates to employment and non-employment as $s^e(x) = exp(\beta^e x)$ and $s^n(x) = exp(\beta^n x)$. Under the assumption that these rates are independent, conditional on the vector of covariates x, Manning (2003) shows that they may be estimated by two separate models. In the modern monopsony literature, at this stage, authors assume that the duration of a given job spell can be described as a Cox Proportional Hazard model. However, in order to follow such model, we would need to assume that the data-generating process was a continuous one. Our data set makes it inadequate to hold such an assumption, since we only possess discrete observations and the survival time of the data in our set is grouped, meaning that we do not observe it continuously over time and that the exact survival times are unknown, since we only observe the sample once per year.

In order to solve this issue, we follow Jenkins (2004) methodology, which proposes a discrete time representation out of a continuous proportional hazards model. In this way, we can estimate the same [3] desired regression coefficients β and φ^h, of the parameters τ_k^h, using interval-censored survival data in a complementary log-log model such as:

$$\lambda^h(a_k, x) = 1 - exp[-exp(\beta^h log(earnings_i(a_k)) + \varphi^h X_i(a_k) + \tau_k^h)], h = \{e, n\} \tag{10}$$

[2] Webber(2015) restricts his sample to firms that had at least 25 separations to employment and unemployment, and 25 recruitments from employment and unemployment.

[3] The same coefficients that would be derived from the proportional hazards model, according to Jenkins (2004).

where $\lambda()$ is the hazard function, t is the length of employment, $earnings_i(t)$ is the individual's total earnings, $X_i(t)$ is a vector of explanatory variables which includes age, gender, education and year dummies, and τ_k describes the duration dependence of the of the separation rate at stake. With respect to τ_k, one will assume two different specifications, the first will be a constant baseline hazard, that sets $\tau_k = 0$ and a second parametric estimation of the baseline hazard, that sets τ_k as the logarithm of tenure in order to control for the duration of any given job spell.

It is important to point out that the coefficient of the logarithm of earnings is an estimate of the respective separation elasticity. For estimation purposes, the entire sample will be used, with the exception of workers that remained with the same employers at the end of the data set that will be considered to have a censored employment spell. Therefore, separations that actually occurred in the last year of the data set cannot be considered in this analysis.

To estimate the third elasticity needed for equation (9), the wage elasticity of the share of recruits from employment, one needs to build a logit model to estimate the probability of a given new worker to be recruited from employment:

$$P_{R,e} = \frac{exp(\beta^{\theta} log(earnings_{it}) + \varphi_{\theta} X_{it})}{1 + exp(\beta^{\theta} log(earnings_{it}) + \varphi_{\theta} X_{it})} \tag{11}$$

where $P_{R,e}$ takes a value of 1 if a worker was recruited from employment and 0 if he was recruited from nonemployment. As in the separations model, X_i contains the same explanatory variables. For this estimation we cannot take directly the desired elasticity from the coefficient of the logarithm of earnings since it would not be consistent with the separation elasticities and also because years with more observations would contribute more to the estimation. Therefore, one has to apply $\epsilon^{R}_{\theta w} = \beta^{\theta} * [1 - \theta_R(w_t)]$, where this second factor comes as an observation-weighted average of year-firm figures.

At this point, in order to obtain firm-level estimates of the labor supply elasticity, one just needs to compute $\theta_R(w_t)$, $\theta_s(w_t)$, $s^e(w_t)$, $s^n(w_t)$ and γ_t to estimate equation (9).

Results

	ϵ^{e}_{sw}	ϵ^{n}_{sw}	$\epsilon^{R}_{\theta w}$	ϵ_{Nw}
Constant baseline hazard				
Firm level	-.0001	-.5958	.5601	-.1644
Aggregate level	-.4559	-.6405	.4202	.4026
Parametric baseline hazard				
Firm level	.2243	-.2881	.5601	-.5159
Aggregate level	-.0408	-.2304	.4202	-.2282

The 1% largest and smallest firm-level estimates were removed from the sample.

Table 1: Aggregate and firm-level average elasticities of labor supply

The results from the estimation of equations (10) and (11) are presented in table 1.

Firstly, one should notice the sizable difference between the firm-level estimates using the model that assumes a constant baseline hazard and the one that relies on a parametric estimation of this component of the hazard function. These results show that both separations to employment and unemployment present negative duration dependence, therefore, when tenure is considered in the model, the estimated separation elasticity is higher. This display of negative duration dependence comes with little surprise, since it was already predicted in previous literature by Manning (2003): "The inclusion of job tenure always drastically reduces the estimated wage elasticity as high-tenure workers are less likely to leave the firm and are more likely to have high wages". The intuition behind this effect is that, when the effect of tenure is included, the likelihood of a given worker to separate from its employers decreases more with a higher wage, since employers with more tenure have higher wages and are less likely to leave the firm. As in previous literature, we will follow this study only considering the estimates from the constant baseline hazard model, since controlling for tenure will capture the effect of wages on the probability of separation of workers, and we want our model to account for this effect.

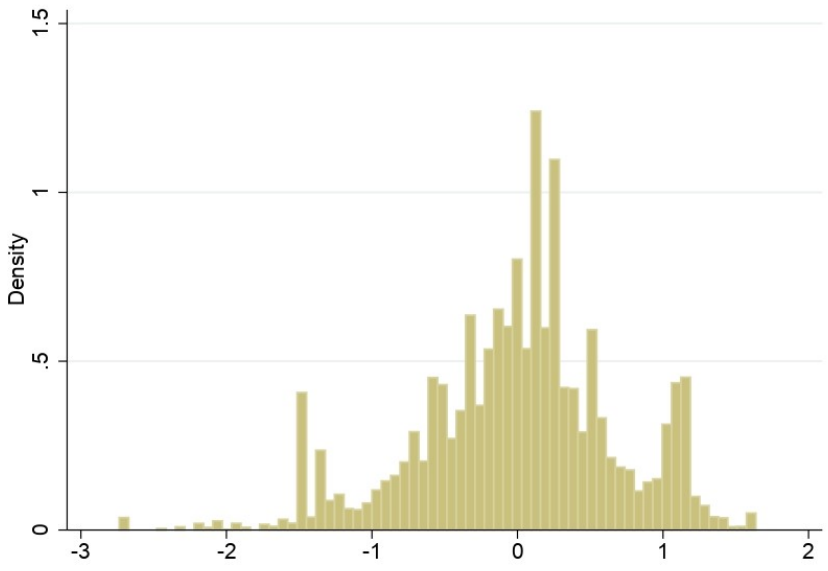

Figure 1: Distribution of the firm-level separation rate elasticities to employment ($\hat{\epsilon}^{e}_{sw}$), using the constant baseline hazard model.

The distribution of the estimates of the separation rate elasticity to employment at the firm-level is presented in Figure 1. As showed in the results table, the weighted [4] firm-level average of the aforementioned elasticity stands in -0.0001. This value differs from the ones presented in previous literature, with Webber (2015) and Hirsch et. al (2018) estimating this value to be -0.6 and -1.4, respectively. There are two conflicting intuitions behind the behavior of such elasticity. On one hand, if one employee has a higher wage, it is expected to have less incentives to leave the firm because it is being rewarded. On the other hand, workers receiving higher wages should be more productive, and therefore, may be more coveted by other firms. It should also be noticed that there is a sizable difference between the aggregated level separation rate elasticity to employment (-0.46) and the firm-level average elasticity. This difference can come from the fact that when doing firm-level estimations, each estimation uses a small part of the sample, which increases the sampling error. In this case, since we are using a non-linear model, this higher error margin may cause the average of the firm-level estimates to be significantly different.

[4] Firm-level average elasticities were weighted by the number of employees in each firm.

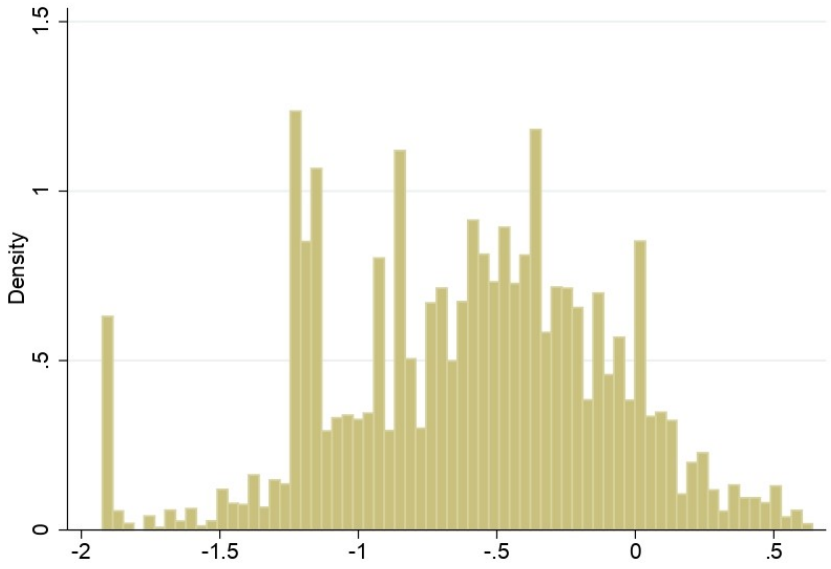

Figure 2: Distribution of the firm-level separation rate elasticities to non-employment ($\hat{\epsilon}^{n}_{sw}$), using the constant baseline hazard model.

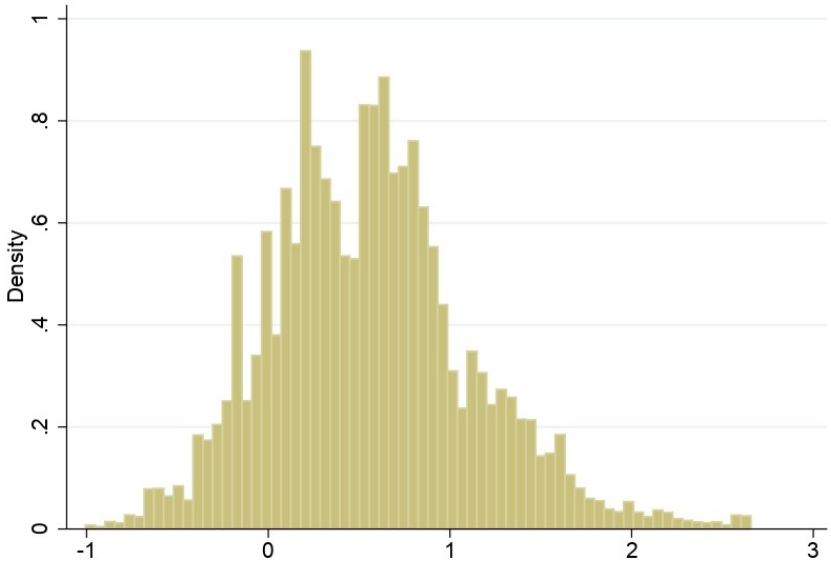

Figure 3: Distribution of the firm-level wage elasticity of the share of recruits from employment ($\hat{\epsilon}^{R}_{\theta w}$).

Figure 2 represents the distribution of the estimates of the separation rate elasticity to non-employment at the firm-level. Again, as depicted in the results table, the weighted firm-level average amounts to -0.5958. This value is in line with previous literature results, with estimations of

-0.67 in Webber (2015) and -1.57 in Hirsch et. al (2018). The figure shows that there is a great amount of dispersion in the firm-level values, with no concentration around the mean value. As expected, for this separation elasticity, the aggregated level estimation (-0.64) is similar with the firm-level weighted average. The intuition for the negative value of this elasticity resides in the fact that, separations to non-employment become less likely for higher wages. It is assumed that, as workers increase their productivity, so does their wage, therefore, it is less likely that workers with higher wages to be discharged.

The distribution of the firm-level wage elasticity of the share of recruits from employment is presented in Figure 3. The weighted average of the firm-level estimations amounts to 0.56. The firm-level values of the recruitment elasticity show reduced dispersion around the mean, presenting a bell-shaped distribution. This estimate is similar to the ones provided in the literature, however it is only directly comparable to the one of Hirsch et. al (2018), since Webber (2015) employs a different methodology. In all cases, this elasticity presents a positive value, this is due to the fact that, for a higher wage, a firm is more likely to recruit workers from other firms, as opposed to recruit unemployed workers that have lower reservation wages.

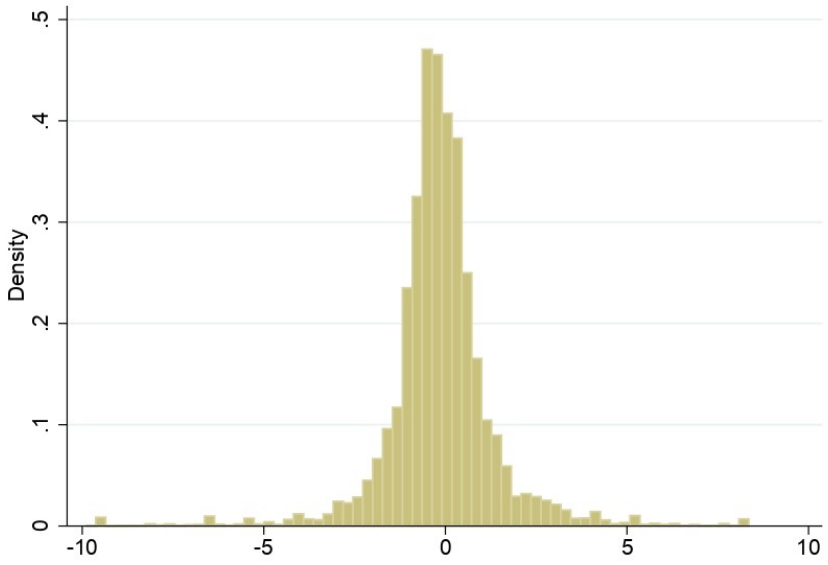

Figure 4: Distribution of the firm-level labor supply elasticity ($\hat{\epsilon}_{Nw}$), using the constant baseline hazard model.

Finally, Figure 4 presents the distribution of the firm-level labor supply elasticities, which presents reduced dispersion and high density of obervations around the mean. The estimated average value of the labor supply elasticity is not directly comparable with what was estimated in previous literature, since our results present significant differences. However, before going in depth, one thing should be clarified, when one talks about monopsony power, it is referring to the wage setting power that some employer has, which is not directly represented by the labor supply elasticity that the firm faces. Félix and Portugal (2017) present monopsony power as the inverse [5] of the labor supply elasticity, as employers with no monopsony power should face an infinite labor supply elasticity. In this study this representation will not be used for estimation purposes.

With this said, one should notice that the estimated firm-level average value of the labor supply elasticity amounts to -0.16, displaying a significant difference from the one estimated at the aggregated level (0.4). Such variation should be justified by the difference in estimations of the elasticity of separations to employment. As mentioned before, the average value of this elasticity presents an odd behavior that could be explained by the increased error margin of the firm-level estimation. In previous studies, Webber (2015) and Hirsch et. al (2018) estimated the labor supply elasticity faced by the firm to be 1.08 and 2.04, respectively. In his analysis of the Portuguese labor market, Garcia (2015) found evidence of even lower figures, with firm-level estimations of 0.57 considering only the base remuneration, and 0.22 considering total earnings.

One should note that, despite having an unexpected result which should not be directly interpreted for its value, this firm-level estimation reveals that firms possess a large degree of monopsony power in the Portuguese labor market. Additionally, the estimate of the elasticity obtained from the pooled regression shows similar values to the ones estimated in the literature for this labor market.

[5] Monopsony Power = 1 / ϵ_{Nw}

6 Minimum wage and Monopsony power

Methodology

The purpose of this study is to estimate the extent of monopsony power in the Portuguese labor market and measure its impact on the minimum wage policy. Having completed the first part, we can use the estimates of the elasticity of labor supply and study the impact of increasing minimum wages.

The general model that will be estimated in this section is the following:

$$\Delta log(employment_t) = \beta_1 \Delta log(earnings_t) + \beta_2 \epsilon_{Nw} + \beta_3 \Delta minwage_t + \beta_4 (\epsilon_{Nw} * \Delta minwage_t) + \theta_t + u_{it} \tag{12}$$

where $\Delta log(employment_t)$, our dependent variable, stands for the first-difference of the logarithm of employment, $\Delta log(earnings_t)$ the first-difference of the logarithm of total earnings, ϵ_{Nw} the estimated firm-level labor supply elasticities, $\Delta minwage_t$ the first-difference for the incidence ratio of minimum wages at the firm-level, $(\epsilon_{Nw} * \Delta minwage_t)$ represents the interaction term of interest for this analysis between the ratio of incidence of minimum wage and the firm level labor supply elasticity, θ_t control time dummies and finally u_{it} the standard error term.

For this model we use the first-difference specification, since we want to measure the impact of changes in the minimum wage, controlling for the variations in total earnings, on the variation of the firm's employment level. Furthermore, using the first-difference estimator we obtain efficient estimates even if u_{it} follows a random walk, as Δu_{it} are serially uncorrelated. Additionally, we use clustered standard errors at the firm-level.

Table 2 presents the estimates for the model specified above. Firstly, one should notice that the coefficients of $d.log(earnings_t)$ and $d.minwage_t$ have opposite signs. It appears that, if total earnings increase, this should have a negative impact on the labor demand elasticity. On the other hand, if the minimum wage incidence increases (which implies an increase in the minimum wage) this has an expected positive impact on employment.

VARIABLES	$\Delta log(employment_t)$
$\Delta log(earnings_t)$	-0.240***
	(0.052)
$\Delta minwage_t$	0.332***
	(0.079)
ϵ_{Nw}	-0.009***
	(0.002)
$\epsilon_{Nw} * \Delta minwage_t$	-0.200***
	(0.064)
Constant	0.052***
	(0.015)
Observations	13,076
R-squared	0.050
Adjusted R-squared	0.0488

Clustered standard-errors in parenthesis; *** p $<$ 0.01, ** p$<$0.05, * p$<$0.1

Table 2: The impact of the labor supply elasticity and minimum wage incidence on employment

The focus of this section resides on trying to comprehend the relation between minimum wages and monopsony power, that as stated before, is the inverse of the labor supply elasticity. Therefore, in this model we estimated the coefficient of the interaction term between ϵ_{Nw} and $d.minwage_t$, wich has a significant negative value. This result implies that, considering a firm with high labor supply elasticity, if the minimum wage incidence increases, the employment level decreases. Therefore, our results are supported by the predictions in the existing literature, since we find evidence that for firms holding lower monopsony power, an increase in the minimum wage reduces the employment level for that firm. This relation goes both ways, meaning that, for firms holding high monopsony power, an increase in the minimum wage is expected to have a positive impact in the employment level.

7 Conclusion

In this paper, we have analyzed the degree of monopsony power of Portuguese employers following an approach based on the dynamic model of monopsonistic competition proposed by Manning (2003). In doing so, we computed firm-level estimates of the labor supply elasticity for the Portuguese labor market. After providing evidence on the difference between estimating the two separations elasticities using a parametrical model or imposing no duration dependence, we concluded that firms face very rigid labor supply curves, which translates in a high amount of monopsony power.

Additionally, after measuring the monopsony power in the Portuguese labor market, we built on the existing dynamic monopsony literature by analyzing the impact of minimum wage policies in the employment level of the labor market. Firstly, we found evidence of an opposing effect, with total employee earnings showing a negative impact in the employment level of a firm, and the minimum wages incidence having a positive impact. Secondly, we estimated our coefficient of interest from the interaction term between the firm-level labor supply elasticities and variation of the incidence of minimum wages. We concluded that, for firms with high monopsony power, a change in the incidence of the minimum wage would have a positive impact in the employment level, meaning that, as the literature predicts, increasing minimum wages in a monopsonistic labor market increases employment.

Although our conclusions point that an increase in minimum wages would have a positive impact the employment level, this is an aggregated effect. Our estimates showed some significant dispersion of monopsony power through employers. Therefore, for some employers with reduced monopsony power, increasing the minimum wage can put them out of business. In this sense, the dispersion of monopsony power in the labor market should be an important factor to have in account when making minimum wage policy. Ideally for a policy maker, each firm should have an optimal minimum wage, however the costs of applying such measure would not be reasonable.

All things considered, this study achieved what was proposed in the beginning, by measuring the monopsony power of employers in the Portuguese labor market and by building on the existing literature, finding empirical evidence of the relation between minimum wages and monopsony

power. In our understanding, further research should improve the estimates of the labor supply elasticity, namely by creating a theoretical framework that could mitigate the existing sampling errors in the elasticities of separations.

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